

Acquisition of an Energy-Filtering Transmission Electron Microscope for Nanocharacterization Research and Student Training

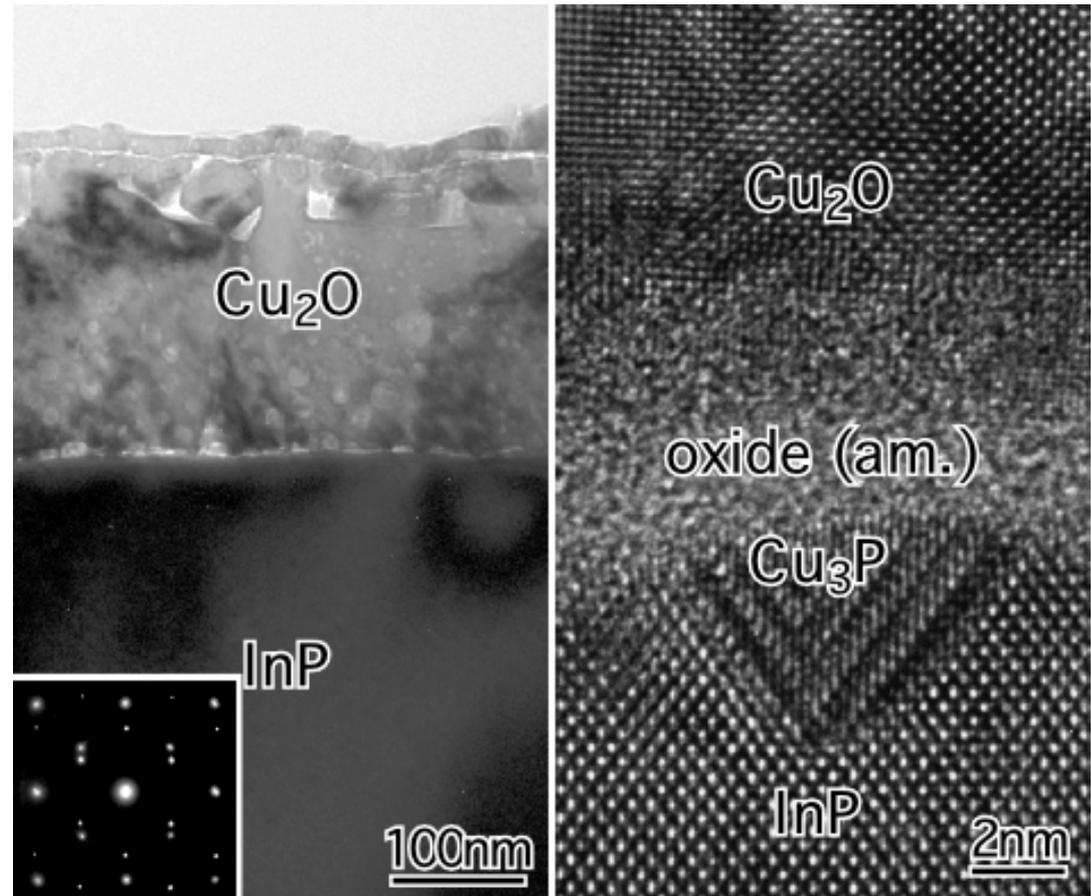
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Case Western Reserve University

DMR-0114134

Diffusion Reactions at Interfaces

The new field-emission gun transmission electron microscope Tecnai F30 (FEI) we have acquired with the help of the NSF award enabled a detailed study of the diffusion reactions at interfaces between InP (indium phosphide) substrates and epitaxial Cu_2O (cuprous oxide) layers, fabricated by electrodeposition (J. Switzer, University of Missouri, Rolla). The micrographs included here reveal the formation of an amorphous oxide layer (InPO_4) and topotaxial particles of Cu_3P in the InP substrate, both indicative of diffusional transport of Cu, O, In and P.



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Education

- In the spring semester of 2004, F. Ernst taught a course on "Advanced Methods of TEM" to about 10 undergraduate and graduate students. The course included eight laboratory sessions, introducing the students to practical work with the Tecnai F30 and advanced microscopy techniques, including XEDS, EELS, EFTEM, and HRTEM.

- Graduate students engaged in research projects on fuel cell catalyst particles, photovoltaic materials, surface alloying of structural alloys, and metal-oxide interfaces have been trained on the new instrument and became proficient users.



Demonstration of the new high-resolution electron microscope Tecnai F30 at CWRU (acquired with financial support from NSF) to 7th and 8th graders of the Ruffing Montessori middle school in Cleveland Heights .